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# Heavy Loading of Freight Cars in the Transportation of Northwestern Apples

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## SUMMARY

**O**WING to a serious car shortage, amounting to over 5,000 refrigerator cars prior to December 15, it was necessary during 1917 to load much heavier than during any previous season and to ship a considerable portion of the Northwestern apple crop in box cars.

Temperatures are maintained about 5° lower in carloads of apples under refrigeration having five layers of boxes than in cars having six layers. The higher temperature shortens the storage and market life of the fruit.

The temperatures of heavy and light loads are nearly the same when shipped under ventilation. When emergency demands heavy loading it should be done during the season of ventilated shipments.

Closing refrigerator car ventilators during the day, or when outside temperatures are high, gives lower and more uniform temperatures than standard ventilation.

More than a third of the box car shipments in 1917 were consigned to markets in Eastern States. Box cars should not be loaded with fruit subject to long-distance shipment.

Careless loading of Western apples during the season of 1917 caused an average breakage of 50 boxes per car in shipments to New York City. More secure car stripping and better bracing are required.

The severity of 1917 shipping troubles was intensified by disregarding indicated conditions. Car supply information and tonnage estimates should be coördinated by the shippers in advance of the shipping season for the best regulation of loading and shipping.

# Heavy Loading of Freight Cars in the Transportation of Northwestern Apples

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## CONTENTS

|   | Page |  | Page |
|---|------|--|------|
| Conditions in 1917.....                     | 3    | Excessive breakage caused by poor loading methods..... | 9    |
| Temperatures in heavy loads.....            | 5    | Relation of heavy loading to distribution....          | 13   |
| Handling heavy loads under ventilation..... | 7    | Methods of shipping during 1917 season....             | 13   |
| Fluctuating temperatures in box cars.....   | 7    | Recommendations.....                                   | 19   |
| Condition upon market arrival.....          | 9    |  |      |

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## CONDITIONS IN 1917

**G**REAT INCREASES in the production of apples in the Northwestern States coupled with critical car shortages seriously handicapped the efforts of the shippers and carriers to transport and market the Northwestern apple crop efficiently during the season of 1917-18. From a production of 14,775 carloads of apples in 1912 in the States of Washington, Oregon, Idaho, and Montana, shipments increased to more than 22,800 carloads for the season 1917-18. Various far-reaching causes resulted in an unprecedented national car shortage. This affected the available supply of refrigerator cars to the extent that during the week of November 9-15, 1917, carriers were able to supply but 423 refrigerator cars at shipping points where the minimum requirements for that week were 1,064 refrigerator cars, each loaded with 756 boxes. While this week marked the most acute stage of the car shortage for the season, its severity existed from October 12 to the end of the calendar year, resulting in the loading of 2,290 box cars in the principal shipping districts during this period. The average load in these box cars was 891.4 boxes. Further than this, the heavier loading of refrigerator cars, brought about by urgent appeals from many sources, resulted in raising their normal load of 630 boxes to an average of 763.1 during the period of heaviest movement (October 5 to December 15). On a basis of 665 boxes as a satisfactory carload, this shows that there was an actual shortage of 4,162 refrigerator cars up to December 15 in handling about half of the crop.

These conditions, anticipated by the Department of Agriculture, demanded that information be secured during the shipping season that would show how heavily refrigerator cars may be loaded for the safe shipment of apples, the best methods for handling such loads, and to what extent box cars may be safely used for this movement.

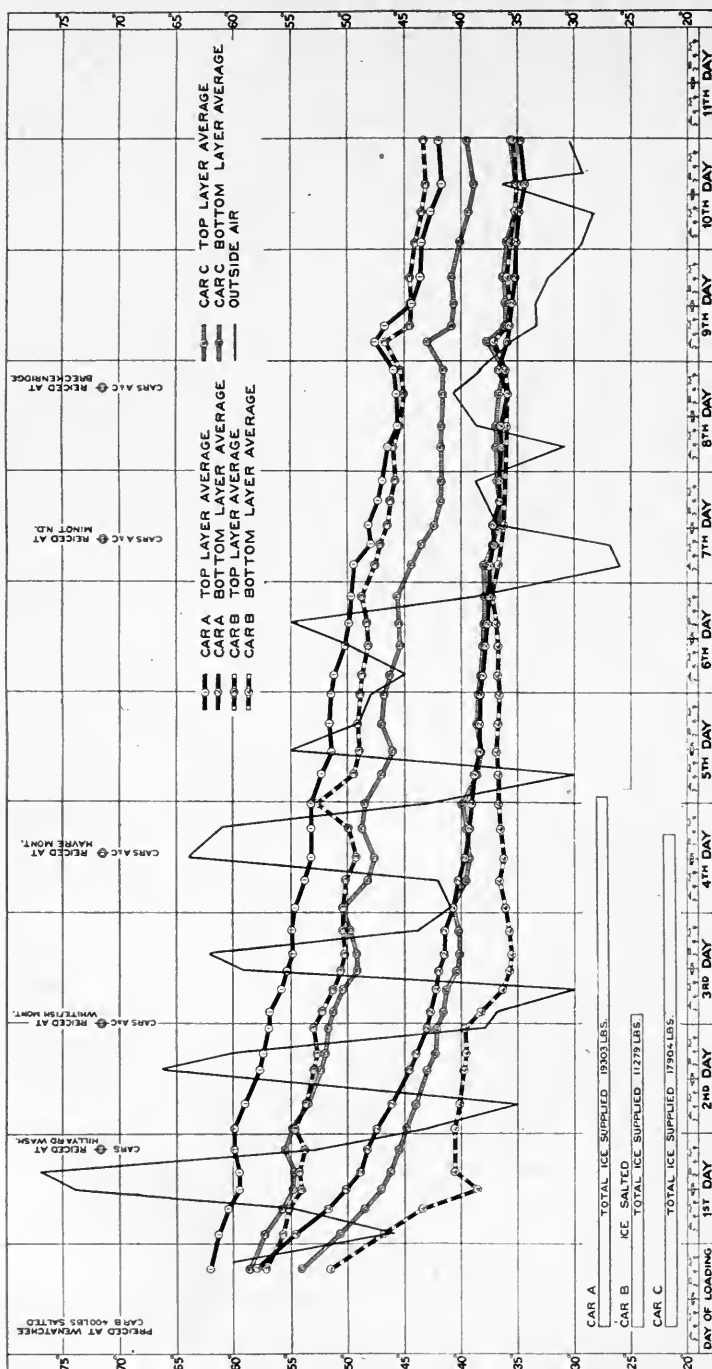


FIG. 1.—Average fruit temperatures in the top and bottom layers in refrigerator cars loaded with boxed apples. Car A having a heavy load, 756 packages, standard refrigeration; Car B, 756 packages, refrigeration salted, not re-iced after leaving Spokane; Car C, light load, 630 packages, standard refrigeration. These cars were in transit from Wenatchee, Wash., to Chicago, Ill., October 9-19, 1917.

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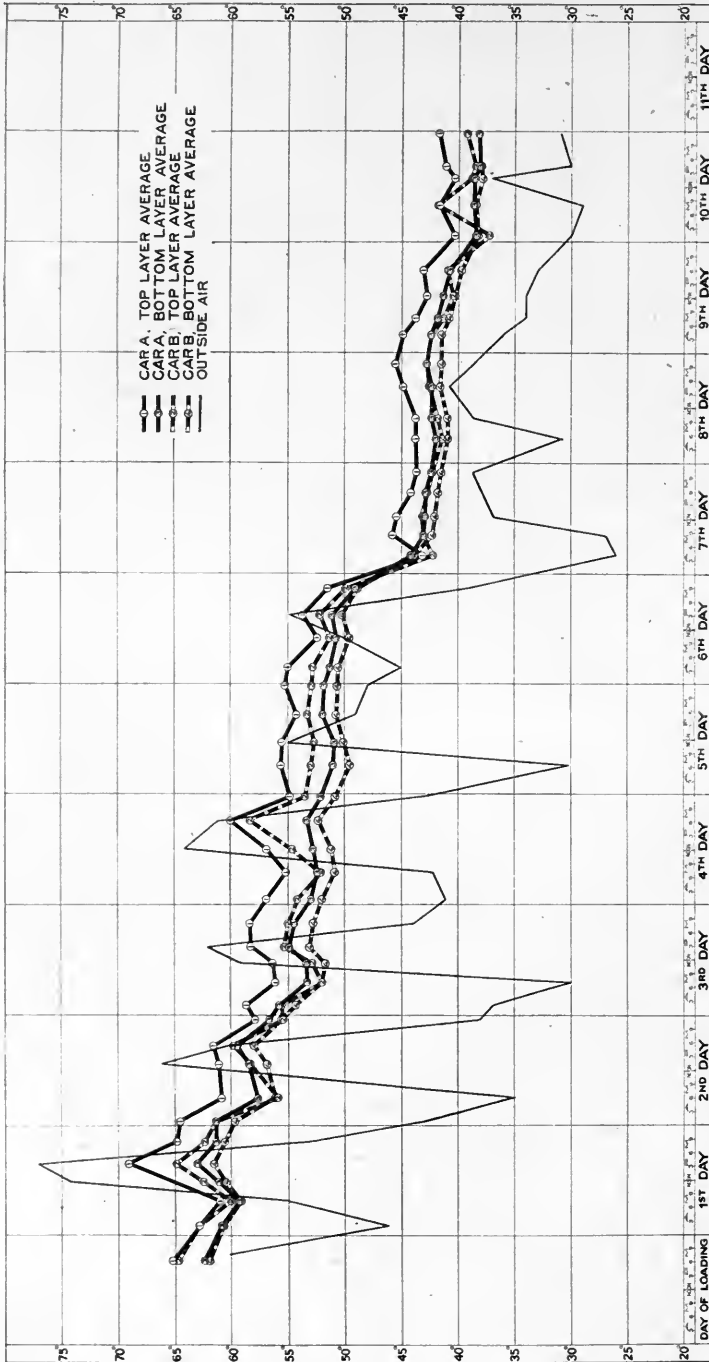


FIG. 2.—Average fruit temperatures in the top and bottom layers in refrigerator cars loaded with boxed apples shipped under standard ventilation. Car A, heavy load, 756 packages; Car B, light load, 630 packages. These cars were in transit from Wenatchee, Wash., to Chicago, Ill., October 9-19, 1917.

### HANDLING HEAVY LOADS UNDER VENTILATION

Under standard ventilation the car ventilators are left open both day and night, unless the outside temperatures become dangerously low, regardless of how warm it becomes during the day. Under controlled ventilation, the ventilators are closed when the outside temperatures become higher than those of the fruit. When shipped under ventilation there is no great difference in temperature between cars heavily loaded and those with normal loads. This is illustrated in figure 2. Under ventilation the range in temperature between the top and bottom layers is less than under refrigeration, but the temperature of the load as a whole is not likely to be as low as when it is shipped under refrigeration unless the ventilated shipment passes through outside temperatures ranging below 40°. This is illustrated in figure 3, wherein comparison is made between the average fruit temperatures in heavy loads under standard refrigeration, standard ventilation and controlled ventilation. Great advantage is found in controlled ventilation over standard ventilation, since lower and more uniform temperatures are maintained where cars have ventilators closed when the outside temperatures are high.

### FLUCTUATING TEMPERATURES IN BOX CARS

Temperature records of fruit shipped in box cars offered very conclusive evidence of the unsuitability of this type of equipment for apple shipments from the Northwest. Figure 4 shows the striking fluctuation in fruit temperatures under the influence of the changes in the outside air temperature. This chart also shows how little one or two ply of building paper protects the fruit from outside temperature changes. The box car has no provision for ventilation and offers neither protection from heat during the warm fall weather nor from freezing during a cold period, and is not suitable for long-distance shipments of apples.

Various methods of temporary insulation and heating were provided for box cars by shippers during the latter part of the shipping season. Figure 6 shows three methods of providing temporary insulation. Car B with an inner wall space 6 inches from the car wall filled with shavings gave the best results. The inner wall held the shavings in place, whereas in the car where the shavings were separated from the fruit load by building paper only the shavings settled somewhat and part of the top became uncovered. The eel-grass quilt offered a protection approximating that of the shavings for short periods of cold weather owing to the very efficient manner in which it was applied. These cars were subjected to a temperature of 13° below zero for a few hours with but slight frost damage on the floor.

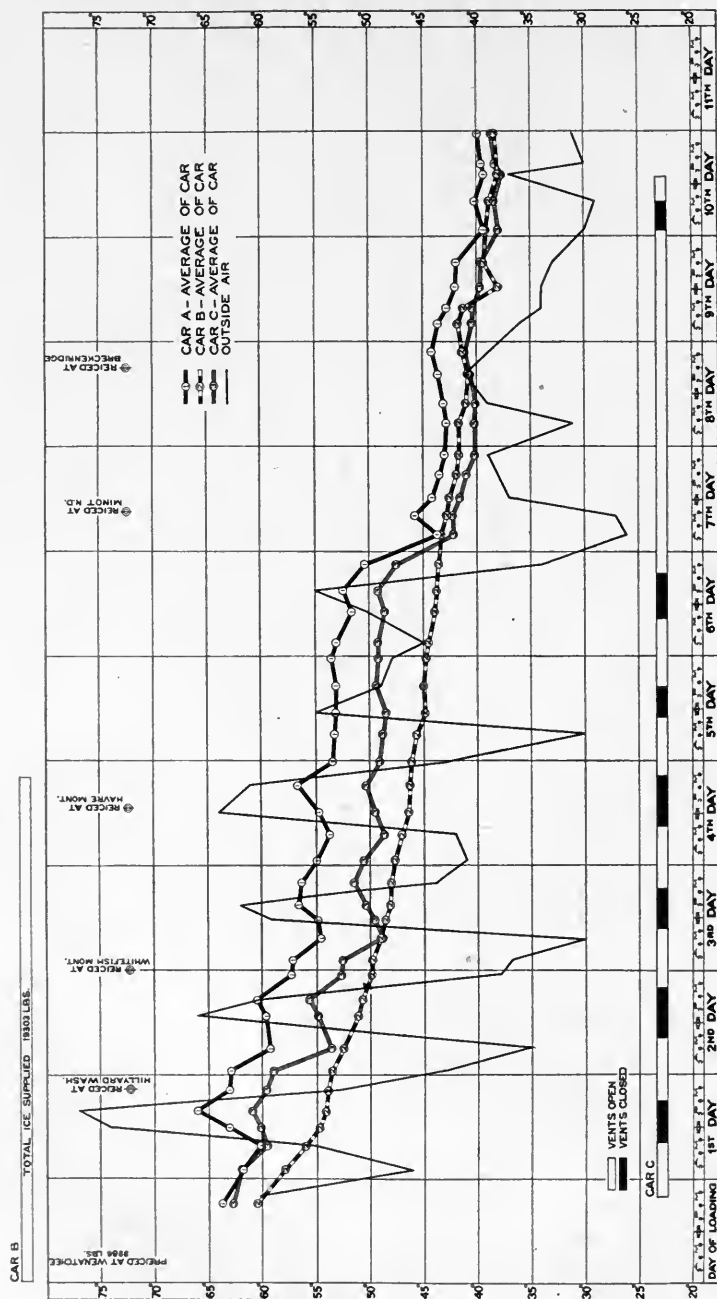


FIG. 3.—Average fruit temperatures in refrigerator cars loaded with boxed apples six layers high, 756 packages. Car A, standard ventilation; Car B, standard refrigeration; Car C, controlled ventilation. These cars were in transit from Wenatchee, Wash., to Chicago, Ill., October 9-19, 1917.



Various other temporary insulation materials and methods have been used, such as straw in place of shavings, building paper, and a combination of paper sheathing and air spaces. All temporary insulation of box cars is expensive and provides uncertain protection.

In heating box cars the best results are obtained by placing the stove in the center of the car and providing an air passage about the fruit inside the temporary insulation. It is especially important that provision be made at the floor and at the ends of the load for the circulation of the heated air.

#### CONDITION UPON MARKET ARRIVAL

Inspections were made during the shipping season in Minneapolis, Chicago, and New York, to determine the effect of heavy loading upon the fruit and upon the condition of the packages when unloaded. The Minneapolis and Chicago inspections indicated no apparent injury to the fruit when loaded six boxes high, but serious shifting and breakage was reported. Of 27 box cars inspected, six were frozen, and one was overripe. Cars loaded through the center without bracing were subject to freezing about the doors. Out of 86 cars inspected, 17 loads had shifted, 10 of them because of poor and insufficient car stripping. Loading on 2" x 4" or 2" x 2" strips resulted in damage, as the boxes tilted or slipped off of the strips.

The New York inspections constitute a more comprehensive test on account of the accumulated effect of the longer period in transit. The average time in transit for the 58 cars from the State of Washington was 24.3 days; six cars from California, 20.8 days; nine cars from Idaho, 19 days; seven cars from Oregon, 20.3 days. Out of 66 refrigerator cars inspected, nine arrived with contents overripe, seven of these cars were loaded six boxes high, with Jonathan, Winter Banana, and Spitzenberg varieties shipped under ventilation late in the season. Since the temperatures in transit (fig. 2) are very nearly the same in heavy and light loads shipped under ventilation, the over-ripeness found cannot be attributed to overloading. Nine out of the 14 box cars inspected contained fruit overripe: one had been frozen.

#### EXCESSIVE BREAKAGE CAUSED BY POOR LOADING METHODS

The additional journey from Chicago to New York resulted in an increased breakage which presents striking evidence in support of the Chicago-Minneapolis report and emphasizes the fact that better methods must be used in carloading, especially with heavy loads and box cars. In the 80 cars inspected, an average of 50 broken boxes per car was found. This breakage was much greater in the heavy loads than in the light loads, and was greater in the box cars than in the refrigerator cars. (See fig. 5.)

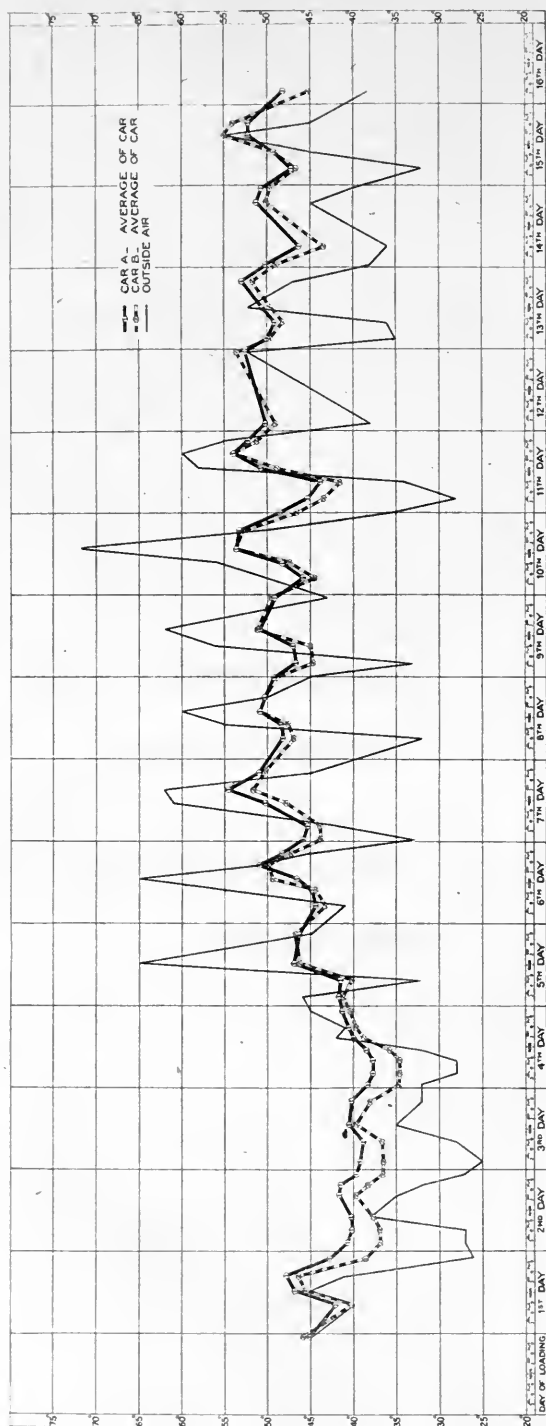


FIG. 4.—Average fruit temperatures in five similar positions in two box cars loaded with boxed apples. Car A having a 2-inch air space and two ply of paper on the floor with one ply of paper on sides, ends and top of load; Car B having a 2-inch air space and four ply of paper on the floor with two ply of paper on sides, ends and top of load. These cars were in transit from Wenatchee, Wash., to Pittsburgh, Pa., October 27 to November 12, 1917.

Careless carloading of apples is responsible for the annual breakage of thousands of boxes. Often but a car strip on one end of a box is used on the third and top layers and these are lightly nailed. While broken boxes are coopered at destination and sold, the cost of cooping, the low prices received, and the resulting decay of the apples from bruises aggregate a tremendous annual loss.

Fifty-six of the eighty loads inspected in New York had shifted, 51 because of poor or insufficient stripping, the others because of poor bracing. Shifting as a result of poor stripping is to one side of the car, causing a gap into which the loosened boxes tumble, effecting a jumbled load and broken boxes. Car strips running full length across the car do not possess great advantage over lath used as strips, if the latter are used in sufficient quantity and are well nailed in proper position.

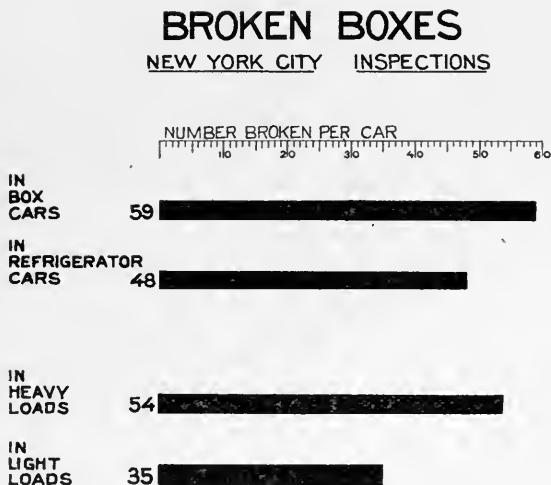


FIG. 5.—Average number of broken boxes found in eighty carloads of apples from the Pacific Coast upon arrival in New York City.

The continual weaving movement of the car in motion has a twisting effect upon the boxes beneath the strips. Several days of this action, combined with vertical vibration, or "jumping," together with sudden end-thrusts, when stopping or shunting, work the nails out of the top strips. With the top layer released, the lower strips also work loose, whereupon the whole load shifts to one side or the other. By tight squeezing and bracing, and by secure stripping, this movement of the boxes may be decreased so that the heavier nails recommended in the top stripping will stay in place sufficiently long to allow delivery of the car without shifting of the load.





TABLE 1.—Recapitulation of northwestern carlot shipments of apples.

[August 15 to December 15, 1917.]

| WEEK.                      | EAST.         |         | WEST.         |           | TOTAL.        |           |
|----------------------------|---------------|---------|---------------|-----------|---------------|-----------|
|                            | Refrigerator. | Box.    | Refrigerator. | Box.      | Refrigerator. | Box.      |
| Aug. 15-30:                |               |         |               |           |               |           |
| Number of cars.....        | 1             |         | 21            |           | 22            |           |
| Number of boxes.....       | 700           |         | 13,443        |           | 14,143        |           |
| Average load.....          | 700           |         | 640           |           | 642.8         |           |
| Sept. 1-6:                 |               |         |               |           |               |           |
| Number of cars.....        | 5             | 1       | 10            |           | 15            | 1         |
| Number of boxes.....       | 3,468         | 630     | 6,505         |           | 9,973         | 630       |
| Average load.....          | 693.6         | 630     | 650.5         |           | 664.8         | 630       |
| Sept. 7-13:                |               |         |               |           |               |           |
| Number of cars.....        | 7             |         | 13            |           | 20            |           |
| Number of boxes.....       | 4,593         |         | 8,666         |           | 13,259        |           |
| Average load.....          | 656.1         |         | 666.6         |           | 662.9         |           |
| Sept. 14-20:               |               |         |               |           |               |           |
| Number of cars.....        | 16            |         | 17            |           | 33            |           |
| Number of boxes.....       | 10,670        |         | 11,187        |           | 21,857        |           |
| Average load.....          | 666.9         |         | 658           |           | 662.3         |           |
| Sept. 21-27:               |               |         |               |           |               |           |
| Number of cars.....        | 44            | 1       | 61            |           | 105           | 1         |
| Number of boxes.....       | 29,626        | 630     | 39,800        |           | 69,426        | 630       |
| Average load.....          | 673.3         | 630     | 652.4         |           | 661.2         | 630       |
| Sept. 28-Oct. 4:           |               |         |               |           |               |           |
| Number of cars.....        | 183           |         | 198           |           | 381           |           |
| Number of boxes.....       | 130,116       |         | 133,627       |           | 263,743       |           |
| Average load.....          | 711           |         | 674.8         |           | 692.2         |           |
| Oct. 5-11:                 |               |         |               |           |               |           |
| Number of cars.....        | 585           | 1       | 517           | 2         | 1,102         | 3         |
| Number of boxes.....       | 404,662       | 752     | 347,293       | 1,321     | 751,955       | 2,073     |
| Average load.....          | 691.7         | 752     | 671.7         | 660.5     | 682.3         | 691       |
| Oct. 12-18:                |               |         |               |           |               |           |
| Number of cars.....        | 682           | 97      | 639           | 72        | 1,321         | 169       |
| Number of boxes.....       | 498,638       | 79,700  | 439,654       | 59,241    | 938,292       | 138,941   |
| Average load.....          | 731.1         | 821.6   | 688           | 822.7     | 710.2         | 822.1     |
| Oct. 19-25:                |               |         |               |           |               |           |
| Number of cars.....        | 553           | 136     | 521           | 118       | 1,074         | 254       |
| Number of boxes.....       | 438,062       | 120,072 | 37,461.4      | 102,840   | 812,676       | 222,912   |
| Average load.....          | 792.1         | 882.8   | 719.0         | 871.5     | 756.6         | 877.6     |
| Oct. 26-Nov. 1:            |               |         |               |           |               |           |
| Number of cars.....        | 303           | 93      | 239           | 222       | 542           | 315       |
| Number of boxes.....       | 243,043       | 88,903  | 183,583       | 195,010   | 426,626       | 283,913   |
| Average load.....          | 802.1         | 955.9   | 768           | 878.4     | 787.1         | 901.3     |
| Nov. 2-8:                  |               |         |               |           |               |           |
| Number of cars.....        | 295           | 133     | 179           | 308       | 474           | 441       |
| Number of boxes.....       | 247,819       | 131,054 | 141,049       | 279,344   | 388,868       | 410,398   |
| Average load.....          | 840.1         | 985.6   | 787.9         | 906.9     | 820.3         | 930.6     |
| Nov. 9-15:                 |               |         |               |           |               |           |
| Number of cars.....        | 241           | 190     | 182           | 335       | 423           | 525       |
| Number of boxes.....       | 200,383       | 171,346 | 143,493       | 289,128   | 343,876       | 460,474   |
| Average load.....          | 831.4         | 901.8   | 788.4         | 863.0     | 812.9         | 877       |
| Nov. 16-22:                |               |         |               |           |               |           |
| Number of cars.....        | 264           | 147     | 198           | 259       | 462           | 406       |
| Number of boxes.....       | 223,415       | 138,139 | 160,355       | 222,359   | 383,770       | 360,498   |
| Average load.....          | 846.2         | 939.7   | 809.8         | 858.5     | 830.6         | 887.9     |
| Nov. 23-29:                |               |         |               |           |               |           |
| Number of cars.....        | 423           | 42      | 331           | 101       | 754           | 143       |
| Number of boxes.....       | 335,983       | 40,426  | 267,660       | 91,128    | 603,643       | 131,554   |
| Average load.....          | 794.3         | 962.5   | 808.6         | 902.2     | 800.5         | 919.9     |
| Nov. 30-Dec. 7:            |               |         |               |           |               |           |
| Number of cars.....        | 386           | 1       | 294           | 22        | 680           | 23        |
| Number of boxes.....       | 312,403       | 686     | 238,477       | 20,404    | 550,880       | 21,090    |
| Average load.....          | 809.3         | 686     | 811.1         | 927.4     | 810.1         | 917       |
| Dec. 8-15:                 |               |         |               |           |               |           |
| Number of cars.....        | 244           | 3       | 238           | 6         | 482           | 9         |
| Number of boxes.....       | 192,556       | 2,293   | 188,001       | 5,934     | 380,557       | 8,227     |
| Average load.....          | 789.1         | 764.3   | 789.9         | 989       | 789.5         | 914.1     |
| Total for season:          |               |         |               |           |               |           |
| Total number of cars.....  | 4,232         | 845     | 3,658         | 1,445     | 7,890         | 2,290     |
| Total number of boxes..... | 3,276,137     | 774,631 | 2,697,407     | 1,260,513 | 5,973,544     | 2,041,340 |
| Average load.....          | 774.1         | 916.7   | 737.2         | 872.3     | 757.1         | 891.4     |

Grand total:

|   |           |
|---|-----------|
| Total number of cars, August 15 to December 15.....     | 10,180    |
| Total number of boxes, August 15 to December 15.....    | 8,014,884 |
| Average load in all cars, August 15 to December 15..... | 787.3     |

TABLE 2.—*Wenatchee District, Washington: Summary of carlot shipments of apples from Wenatchee and Northern Columbia shipping points.*

[August 15 to December 15, 1917.]

| WEEK.                      | EAST.         |             |         | WEST.         |             |         | TOTAL.                       |           |
|----------------------------|---------------|-------------|---------|---------------|-------------|---------|------------------------------|-----------|
|                            | Refrigerator. | Ventilated. | Box.    | Refrigerator. | Ventilated. | Box.    | Refrigerator and ventilated. | Box.      |
| Aug. 15-30:                |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 1             | -----       | -----   | 13            | 1           | -----   | 15                           | -----     |
| Number of boxes.....       | 700           | -----       | -----   | 8,413         | 522         | -----   | 9,635                        | -----     |
| Average load.....          | 700           | -----       | -----   | 647           | 522         | -----   | 642.3                        | -----     |
| Sept. 1-7:                 |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 5             | -----       | -----   | 4             | -----       | -----   | 9                            | -----     |
| Number of boxes.....       | 3,468         | -----       | -----   | 2,690         | -----       | -----   | 6,158                        | -----     |
| Average load.....          | 693.6         | -----       | -----   | 672.5         | -----       | -----   | 684.2                        | -----     |
| Sept. 7-13:                |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 6             | -----       | -----   | 9             | 2           | -----   | 17                           | -----     |
| Number of boxes.....       | 3,928         | -----       | -----   | 6,097         | 1,309       | -----   | 11,334                       | -----     |
| Average load.....          | 654.6         | -----       | -----   | 677.6         | 654.5       | -----   | 666.7                        | -----     |
| Sept. 14-20:               |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 11            | 2           | -----   | 6             | 3           | -----   | 22                           | -----     |
| Number of boxes.....       | 7,149         | 1,382       | -----   | 3,770         | 2,180       | -----   | 14,481                       | -----     |
| Average load.....          | 649.9         | 691         | -----   | 628.3         | 726.6       | -----   | 658.2                        | -----     |
| Sept. 21-27:               |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 31            | 7           | -----   | 18            | 13          | -----   | 69                           | -----     |
| Number of boxes.....       | 21,019        | 4,606       | -----   | 11,223        | 8,970       | -----   | 45,818                       | -----     |
| Average load.....          | 678           | 658         | -----   | 623.5         | 690         | -----   | 664                          | -----     |
| Sept. 28-Oct. 4:           |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 91            | 39          | -----   | 25            | 77          | -----   | 232                          | -----     |
| Number of boxes.....       | 67,804        | 27,004      | -----   | 16,608        | 52,928      | -----   | 164,344                      | -----     |
| Average load.....          | 745.1         | 699.3       | -----   | 664.3         | 687.3       | -----   | 708.5                        | -----     |
| Oct 5-11:                  |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 181           | 146         | 1       | 50            | 96          | 2       | 473                          | 3         |
| Number of boxes.....       | 128,503       | 106,041     | 752     | 34,036        | 69,492      | 1,321   | 338,072                      | 2,073     |
| Average load.....          | 709.9         | 726.3       | 752     | 680.7         | 723.8       | 660.5   | 714.7                        | 691       |
| Oct. 12-18:                |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 217           | 171         | 95      | 63            | 83          | 69      | 534                          | 164       |
| Number of boxes.....       | 165,087       | 130,981     | 78,388  | 46,717        | 62,156      | 56,811  | 404,941                      | 135,199   |
| Average load.....          | 760.7         | 765.8       | 825.1   | 741.5         | 748.8       | 823.3   | 758.3                        | 824.4     |
| Oct. 19-25:                |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 156           | 154         | 134     | 37            | 62          | 107     | 409                          | 241       |
| Number of boxes.....       | 120,633       | 119,455     | 118,350 | 28,956        | 49,442      | 92,973  | 318,486                      | 211,323   |
| Average load.....          | 773.3         | 775.6       | 883.2   | 782.5         | 797.4       | 868.9   | 766.4                        | 876.8     |
| Oct. 26-Nov. 1:            |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 58            | 112         | 74      | 15            | 45          | 95      | 230                          | 169       |
| Number of boxes.....       | 47,053        | 92,183      | 71,470  | 12,282        | 35,769      | 88,307  | 187,287                      | 159,777   |
| Average load.....          | 811.2         | 823         | 965.8   | 818.8         | 794.8       | 928.4   | 814.3                        | 945.4     |
| Nov. 2-8:                  |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 154           | 49          | 100     | 53            | 16          | 105     | 272                          | 205       |
| Number of boxes.....       | 132,734       | 41,489      | 102,276 | 44,066        | 13,458      | 99,229  | 231,747                      | 201,505   |
| Average load.....          | 862.9         | 846.5       | 1,022.7 | 831.6         | 841.1       | 945     | 852                          | 982.9     |
| Nov. 9-15:                 |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 92            | 1           | 101     | 41            | -----       | 113     | 134                          | 214       |
| Number of boxes.....       | 81,104        | 866         | 93,725  | 34,438        | -----       | 103,463 | 116,408                      | 197,188   |
| Average load.....          | 881.5         | 866         | 928     | 839.9         | -----       | 915.6   | 868.7                        | 921.4     |
| Nov. 16-22:                |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 128           | -----       | 117     | 50            | -----       | 82      | 178                          | 199       |
| Number of boxes.....       | 112,690       | -----       | 109,992 | 43,005        | -----       | 73,044  | 155,695                      | 183,036   |
| Average load.....          | 880.4         | -----       | 940.1   | 860.1         | -----       | 890.8   | 874.7                        | 919.8     |
| Nov. 23-29:                |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 243           | -----       | 31      | 106           | -----       | 32      | 349                          | 63        |
| Number of boxes.....       | 199,579       | -----       | 30,228  | 87,119        | -----       | 27,600  | 286,698                      | 57,828    |
| Average load.....          | 821.3         | -----       | 975     | 821.8         | -----       | 862.5   | 821.4                        | 917.9     |
| Nov. 30-Dec. 7:            |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 230           | -----       | 1       | 76            | -----       | 8       | 306                          | 9         |
| Number of boxes.....       | 188,208       | -----       | 686     | 61,796        | -----       | 6,387   | 250,004                      | 7,073     |
| Average load.....          | 818.3         | -----       | 686     | 813.1         | -----       | 798.4   | 817                          | 785.9     |
| Dec. 8-15:                 |               |             |         |               |             |         |                              |           |
| Number of cars.....        | 89            | -----       | 3       | 68            | -----       | -----   | 157                          | 3         |
| Number of boxes.....       | 70,072        | -----       | 2,293   | 55,144        | -----       | -----   | 125,216                      | 2,293     |
| Average load.....          | 787.3         | -----       | 764.3   | 810.9         | -----       | -----   | 797.5                        | 764.3     |
| Total for season:          |               |             |         |               |             |         |                              |           |
| Total number of cars.....  | 1,693         | 681         | 657     | 634           | 398         | 613     | 3,406                        | 1,270     |
| Total number of boxes..... | 1,349,731     | 524,007     | 608,160 | 496,360       | 296,226     | 549,135 | 2,666,324                    | 1,157,295 |
| Average load.....          | 797.2         | 769.4       | 925.6   | 782.9         | 744.2       | 895.8   | 782.8                        | 911.3     |

Grand total:

|   |           |
|---|-----------|
| Total number of cars, August 15 to December 15.....     | 4,676     |
| Total number of boxes, August 15 to December 15.....    | 3,823,819 |
| Average load in all cars, August 15 to December 15..... | 817.7     |

## Heavy Loading of Northwestern Apples

TABLE 3.—Yakima District, Washington: Summary of carlot shipments of apples from Yakima Valley shipping points.

[August 15 to December 15, 1917.]

| WEEK.            | EAST.         |        | WEST.         |         | TOTAL.        |         |
|------------------|---------------|--------|---------------|---------|---------------|---------|
|                  | Refrigerator. | Box.   | Refrigerator. | Box.    | Refrigerator. | Box.    |
| Aug. 15-30:      |               |        |               |         |               |         |
| Number of cars   | -----         | -----  | 7             | -----   | 7             | -----   |
| Number of boxes  | -----         | -----  | 4,508         | -----   | 4,508         | -----   |
| Average load     | -----         | -----  | 644           | -----   | 644           | -----   |
| Sept. 1-6:       |               |        |               |         |               |         |
| Number of cars   | -----         | 1      | 6             | -----   | 6             | 1       |
| Number of boxes  | -----         | 630    | 3,815         | -----   | 3,815         | 630     |
| Average load     | -----         | 630    | 635.8         | -----   | 635.8         | 630     |
| Sept. 7-13:      |               |        |               |         |               |         |
| Number of cars   | 1             | -----  | 2             | -----   | 3             | -----   |
| Number of boxes  | 665           | -----  | 1,260         | -----   | 1,925         | -----   |
| Average load     | 665           | -----  | 630           | -----   | 641.6         | -----   |
| Sept. 14-20:     |               |        |               |         |               |         |
| Number of cars   | 3             | -----  | 8             | -----   | 11            | -----   |
| Number of boxes  | 2,139         | -----  | 5,237         | -----   | 7,376         | -----   |
| Average load     | 713           | -----  | 654.6         | -----   | 670.5         | -----   |
| Sept. 21-27:     |               |        |               |         |               |         |
| Number of cars   | 6             | 1      | 30            | -----   | 36            | 1       |
| Number of boxes  | 4,001         | 630    | 19,607        | -----   | 23,608        | 630     |
| Average load     | 666.8         | 630    | 653.5         | -----   | 655.7         | 630     |
| Sept. 28-Oct. 4: |               |        |               |         |               |         |
| Number of cars   | 35            | -----  | 96            | -----   | 131           | -----   |
| Number of boxes  | 23,519        | -----  | 64,091        | -----   | 87,610        | -----   |
| Average load     | 672           | -----  | 667.6         | -----   | 668.7         | -----   |
| Oct. 5-11:       |               |        |               |         |               |         |
| Number of cars   | 211           | -----  | 334           | -----   | 545           | -----   |
| Number of boxes  | 136,645       | -----  | 218,653       | -----   | 355,298       | -----   |
| Average load     | 647.6         | -----  | 654.6         | -----   | 651.9         | -----   |
| Oct. 12-18:      |               |        |               |         |               |         |
| Number of cars   | 238           | 2      | 419           | 1       | 657           | 3       |
| Number of boxes  | 157,681       | 1,312  | 278,286       | 756     | 435,967       | 2,068   |
| Average load     | 662.5         | 656    | 664.1         | 756     | 663.5         | 689.3   |
| Oct. 19-25:      |               |        |               |         |               |         |
| Number of cars   | 179           | 2      | 355           | 7       | 534           | 9       |
| Number of boxes  | 147,025       | 1,722  | 246,579       | 6,049   | 393,604       | 7,771   |
| Average load     | 821.3         | 861    | 736           | 864.1   | 737           | 863.4   |
| Oct. 26-Nov. 1:  |               |        |               |         |               |         |
| Number of cars   | 84            | 7      | 141           | 111     | 225           | 118     |
| Number of boxes  | 63,310        | 5,677  | 104,269       | 92,336  | 167,579       | 98,013  |
| Average load     | 753.7         | 811    | 739.4         | 831.8   | 744.7         | 830.6   |
| Nov. 2-8:        |               |        |               |         |               |         |
| Number of cars   | 38            | 16     | 80            | 150     | 118           | 166     |
| Number of boxes  | 28,766        | 13,898 | 60,107        | 132,517 | 88,873        | 146,415 |
| Average load     | 757           | 868.6  | 751.3         | 883.4   | 753.1         | 882     |
| Nov. 9-15:       |               |        |               |         |               |         |
| Number of cars   | 75            | 43     | 90            | 154     | 165           | 197     |
| Number of boxes  | 58,920        | 34,925 | 69,761        | 124,101 | 128,681       | 159,026 |
| Average load     | 785.6         | 812.2  | 775.1         | 805.8   | 779.8         | 807.7   |
| Nov. 16-22:      |               |        |               |         |               |         |
| Number of cars   | 54            | 27     | 95            | 142     | 149           | 169     |
| Number of boxes  | 43,583        | 25,635 | 76,244        | 119,209 | 119,827       | 144,844 |
| Average load     | 807           | 949.4  | 802.5         | 839.5   | 804.2         | 857     |
| Nov. 23-29:      |               |        |               |         |               |         |
| Number of cars   | 110           | 9      | 171           | 52      | 281           | 61      |
| Number of boxes  | 78,846        | 8,382  | 136,887       | 47,670  | 215,733       | 56,052  |
| Average load     | 716.7         | 931.3  | 800.5         | 916.7   | 767.7         | 918.8   |
| Dec. 1-7:        |               |        |               |         |               |         |
| Number of cars   | 105           | -----  | 178           | 8       | 283           | 8       |
| Number of boxes  | 83,140        | -----  | 145,482       | 7,882   | 228,622       | 7,882   |
| Average load     | 791.8         | -----  | 817.3         | 986     | 807.8         | 985.2   |
| Dec. 8-14:       |               |        |               |         |               |         |
| Number of cars   | 45            | -----  | 113           | 6       | 158           | 6       |
| Number of boxes  | 35,493        | -----  | 86,556        | 5,934   | 122,049       | 5,934   |
| Average load     | 788.7         | -----  | 765.9         | 989     | 772.4         | 989     |
| Dec. 15-21:      |               |        |               |         |               |         |
| Number of cars   | 1,184         | 108    | 2,125         | 631     | 3,309         | 739     |
| Number of boxes  | 863,733       | 92,811 | 1,521,342     | 536,454 | 2,385,075     | 629,265 |
| Average load     | 729.5         | 859.3  | 715.9         | 850.1   | 720.7         | 851.5   |

er of cars, August 15 to December 15..... 4,042  
 er of boxes, August 15 to December 15..... 3,314,340  
 d in all cars, August 15 to December 15..... 745.7



even though some varieties have qualities that enable them to stand abuse longer than others. It follows that when radically diversified methods are employed with cars moving through identical climatic conditions, some of the fruit is subject to undesirable shipping conditions.

Table 1 shows that heavy loading of refrigerator cars was not universally begun until the week of October 19 to 25, and that the heaviest loading occurred during the week of November 16 to 22, when the average carload was 830.6 boxes. This was five weeks after the heaviest movement under ventilation and well into the

TABLE 4.—*Hood River District, Oregon: Summary of carlot shipments of apples from Hood River shipping points.*

[August 15 to December 15, 1917.]

| WEEK.                      | EAST.         |        | WEST.         |        | TOTAL.        |         |
|----------------------------|---------------|--------|---------------|--------|---------------|---------|
|                            | Refrigerator. | Box.   | Refrigerator. | Box.   | Refrigerator. | Box.    |
| Oct. 15-Oct. 4:            |               |        |               |        |               |         |
| Number of cars.....        | 18            |        |               |        | 18            |         |
| Number of boxes.....       | 11,789        |        |               |        | 11,789        |         |
| Average load.....          | 654.9         |        |               |        | 654.9         |         |
| Oct. 5-11:                 |               |        |               |        |               |         |
| Number of cars.....        | 23            |        | 6             |        | 29            |         |
| Number of boxes.....       | 17,260        |        | 4,564         |        | 21,824        |         |
| Average load.....          | 750.4         |        | 760.6         |        | 752.5         |         |
| Oct. 12-18:                |               |        |               |        |               |         |
| Number of cars.....        | 50            |        | 27            |        | 77            |         |
| Number of boxes.....       | 40,515        |        | 19,373        |        | 59,888        |         |
| Average load.....          | 810.3         |        | 717.5         |        | 777.7         |         |
| Oct. 19-25:                |               |        |               |        |               |         |
| Number of cars.....        | 50            |        | 29            |        | 79            |         |
| Number of boxes.....       | 41,764        |        | 21,697        |        | 63,461        |         |
| Average load.....          | 835.2         |        | 748.1         |        | 803           |         |
| Oct. 26-Nov. 1:            |               |        |               |        |               |         |
| Number of cars.....        | 30            | 12     | 12            | 3      | 42            | 15      |
| Number of boxes.....       | 25,609        | 11,756 | 10,092        | 2,922  | 35,791        | 14,678  |
| Average load.....          | 856.6         | 979.6  | 841           | 974    | 852.1         | 978.5   |
| Nov. 2-8:                  |               |        |               |        |               |         |
| Number of cars.....        | 29            | 12     | 5             | 28     | 74            | 40      |
| Number of boxes.....       | 24,704        | 10,338 | 4,121         | 25,181 | 28,825        | 35,519  |
| Average load.....          | 851.8         | 861.5  | 824.2         | 899.3  | 847.7         | 887.9   |
| Nov. 9-15:                 |               |        |               |        |               |         |
| Number of cars.....        | 28            | 38     | 11            | 30     | 39            | 68      |
| Number of boxes.....       | 23,887        | 35,467 | 8,902         | 24,527 | 32,789        | 59,994  |
| Average load.....          | 853.1         | 933.3  | 809.2         | 817.5  | 840.7         | 882.2   |
| Nov. 16-22:                |               |        |               |        |               |         |
| Number of cars.....        | 58            | 2      | 17            | 28     | 75            | 30      |
| Number of boxes.....       | 47,747        | 1,704  | 13,738        | 24,094 | 61,485        | 25,708  |
| Average load.....          | 823.2         | 852    | 808.1         | 857.2  | 819.7         | 856.9   |
| Nov. 23-29:                |               |        |               |        |               |         |
| Number of cars.....        | 44            |        | 10            | 12     | 54            | 12      |
| Number of boxes.....       | 36,373        |        | 8,430         | 10,802 | 44,803        | 10,802  |
| Average load.....          | 826.6         |        | 843           | 900    | 829.6         | 900.1   |
| Nov. 30-Dec. 6:            |               |        |               |        |               |         |
| Number of cars.....        | 17            |        | 11            | 3      | 28            | 3       |
| Number of boxes.....       | 13,316        |        | 8,534         | 2,863  | 21,850        | 2,863   |
| Average load.....          | 783.2         |        | 775.8         | 954.3  | 780           | 954.3   |
| Dec. 7-15:                 |               |        |               |        |               |         |
| Number of cars.....        | 90            |        | 17            |        | 107           |         |
| Number of boxes.....       | 70,970        |        | 13,481        |        | 84,451        |         |
| Average load.....          | 788.5         |        | 793           |        | 789.2         |         |
| Total for season:          |               |        |               |        |               |         |
| Total number of cars.....  | 437           | 64     | 145           | 104    | 582           | 168     |
| Total number of boxes..... | 354,024       | 59,265 | 112,932       | 90,299 | 466,956       | 149,564 |
| Average load.....          | 810.1         | 926    | 778.8         | 868.2  | 802.3         | 890.    |

Grand total:

|   |         |
|---|---------|
| Total number of cars, August 15 to December 15.....     | 750     |
| Total number of boxes, August 15 to December 15.....    | 616,520 |
| Average load in all cars, August 15 to December 15..... | 822     |

season when heating precautions should have been taken. The best treatment of the apples would have been for the heaviest loads to move under ventilation.

Box cars were not extensively used until the week of October 12 to 18 and their greatest use was during the week of November 9 to 15, when 525 were shipped. Out of 10,180 carloads, shipped from the Northwest, 2,290 loads were shipped in box cars, more than 845 of which had destinations in Eastern States.

Comparing the weekly shipments from different districts, a wide variation is found in the weight of the loads in different shipping localities. During the week of October 12 to 18, the average refriger-

TABLE 5.—*Western Oregon District: Summary of carlot shipments of apples from Medford, Grants Pass, Gold Hill, Voorhies, Dallas, and Ashland.*

[August 15 to December 15, 1917.]

| WEEK.                 | EAST.         |      | WEST.         |        | TOTAL.        |         |
|-----------------------|---------------|------|---------------|--------|---------------|---------|
|                       | Refrigerator. | Box. | Refrigerator. | Box.   | Refrigerator. | Box.    |
| Oct. 5-11:            |               |      |               |        |               |         |
| Number of cars        | 9             |      | 3             |        | 12            |         |
| Number of boxes       | 6,582         |      | 2,181         |        | 8,763         |         |
| Average load          | 731.3         |      | 727           |        | 730.2         |         |
| Oct. 12-18:           |               |      |               |        |               |         |
| Number of cars        | 2             |      | 10            | 2      | 12            | 2       |
| Number of boxes       | 1,470         |      | 7,587         | 1,674  | 9,057         | 1,674   |
| Average load          | 735           |      | 758.7         | 837    | 754.7         | 837     |
| Oct. 19-25:           |               |      |               |        |               |         |
| Number of cars        | 3             |      | 7             | 3      | 10            | 3       |
| Number of boxes       | 2,016         |      | 4,946         | 2,393  | 6,962         | 2,393   |
| Average load          | 672           |      | 706.5         | 798    | 696.2         | 797.6   |
| Oct. 26-Nov. 1:       |               |      |               |        |               |         |
| Number of cars        | 11            |      | 7             | 2      | 18            | 2       |
| Number of boxes       | 8,267         |      | 5,074         | 1,674  | 13,341        | 1,674   |
| Average load          | 751.5         |      | 725           | 837    | 741.1         | 837     |
| Nov. 2-8:             |               |      |               |        |               |         |
| Number of cars        | 7             |      | 6             | 8      | 13            | 8       |
| Number of boxes       | 5,327         |      | 4,871         | 6,168  | 10,198        | 6,168   |
| Average load          | 761           |      | 811.8         | 771    | 784.4         | 771     |
| Nov. 9-15:            |               |      |               |        |               |         |
| Number of cars        | 17            |      | 18            | 5      | 35            | 5       |
| Number of boxes       | 12,796        |      | 13,962        | 5,175  | 26,758        | 5,175   |
| Average load          | 752.7         |      | 757.6         | 1,035  | 764.5         | 1,035   |
| Nov. 16-22:           |               |      |               |        |               |         |
| Number of cars        | 6             |      | 8             | 4      | 14            | 4       |
| Number of boxes       | 4,905         |      | 6,085         | 3,182  | 10,990        | 3,182   |
| Average load          | 817.5         |      | 760.6         | 795.5  | 785           | 795.5   |
| Nov. 23-29:           |               |      |               |        |               |         |
| Number of cars        | 19            | 1    | 16            | 2      | 35            | 3       |
| Number of boxes       | 15,185        | 808  | 12,246        | 1,956  | 27,431        | 2,764   |
| Average load          | 799.2         |      | 765.3         | 978    | 783.7         | 921.3   |
| Nov. 30-Dec. 6:       |               |      |               |        |               |         |
| Number of cars        | 29            |      | 9             | 3      | 38            | 3       |
| Number of boxes       | 23,313        |      | 6,333         | 3,272  | 29,646        | 3,272   |
| Average load          | 803.8         |      | 703.6         | 1,091  | 780.1         | 1,090.6 |
| Dec. 7-15:            |               |      |               |        |               |         |
| Number of cars        | 16            |      | 15            |        | 31            |         |
| Number of boxes       | 12,997        |      | 13,062        |        | 26,059        |         |
| Average load          | 812.3         |      | 870.8         |        | 840.6         |         |
| Total for season:     |               |      |               |        |               |         |
| Total number of cars  | 119           | 1    | 99            | 29     | 218           | 30      |
| Total number of boxes | 92,858        | 808  | 76,347        | 25,494 | 169,205       | 26,302  |
| Average load          | 789.3         |      | 771.1         | 879.1  | 776.1         | 876.7   |

Grand total:

|  |         |
|--|---------|
| Total number of cars, August 15 to December 15     | 248     |
| Total number of boxes, August 15 to December 15    | 195,507 |
| Average load in all cars, August 15 to December 15 | 788.3   |

ator carloads were as follows: Hood River, 777.7 boxes; Wenatchee, 758.3 boxes; Western Oregon, 754.7 boxes; Eastern Washington, 693.6 boxes, and Yakima, 663.5 boxes. Local storage facilities and competitive transportation conditions to some extent regulate heavy loading activities in different districts.

## RECOMMENDATIONS

The following recommendations are based upon the investigations that have been made, as well as upon the results of methods used in commercial practice so far as these have proved efficient and of such practical value as to warrant their wider application.

TABLE 6.—*Eastern District, Washington, Oregon, and Idaho: Summary of carlot shipments of apples from Walla Walla, Lewiston, Milton, Freewater, Mosier, Taggard, and Dufur.*

[August 15 to December 15, 1917.]

| WEEK.                      | EAST.         |        | WEST.         |         | TOTAL.        |        |
|----------------------------|---------------|--------|---------------|---------|---------------|--------|
|                            | Refrigerator. | Box.   | Refrigerator. | Box.    | Refrigerator. | Box.   |
| Oct. 5-11:                 |               |        |               |         |               |        |
| Number of cars.....        | 15            |        | 28            |         | 43            |        |
| Number of boxes.....       | 9,631         |        | 18,567        |         | 27,998        |        |
| Average load.....          | 642           |        | 656           |         | 651.1         |        |
| Oct. 12-18:                |               |        |               |         |               |        |
| Number of cars.....        | 4             |        | 37            |         | 41            |        |
| Number of boxes.....       | 2,904         |        | 25,535        |         | 28,439        |        |
| Average load.....          | 726           |        | 690.1         |         | 693.6         |        |
| Oct. 19-25:                |               |        |               |         |               |        |
| Number of cars.....        | 11            |        | 31            | 1       | 42            | 1      |
| Number of boxes.....       | 7,969         |        | 22,994        | 1,425   | 30,963        | 1,425  |
| Average load.....          | 724.4         |        | 741.7         | 1,425   | 737.2         | 1,425  |
| Oct. 26-Nov. 1:            |               |        |               |         |               |        |
| Number of cars.....        | 8             |        | 19            | 11      | 27            | 11     |
| Number of boxes.....       | 6,531         |        | 16,097        | 9,771   | 22,628        | 9,771  |
| Average load.....          | 816.4         |        | 847.2         | 888.2   | 838           | 888.2  |
| Nov. 2-8:                  |               |        |               |         |               |        |
| Number of cars.....        | 18            | 5      | 19            | 17      | 37            | 22     |
| Number of boxes.....       | 14,799        | 4,542  | 14,326        | 16,249  | 29,125        | 20,791 |
| Average load.....          | 821.0         | 908.4  | 754           | 955.8   | 787.1         | 945    |
| Nov. 9-15:                 |               |        |               |         |               |        |
| Number of cars.....        | 28            | 8      | 22            | 33      | 50            | 41     |
| Number of boxes.....       | 22,810        | 7,229  | 16,430        | 31,862  | 39,240        | 39,091 |
| Average load.....          | 814.6         | 903.6  | 746.8         | 965.5   | 784.8         | 953.4  |
| Nov. 16-22:                |               |        |               |         |               |        |
| Number of cars.....        | 18            | 1      | 28            | 3       | 46            | 4      |
| Number of boxes.....       | 14,490        | 808    | 21,283        | 2,920   | 35,773        | 3,728  |
| Average load.....          | 805           | 808    | 760.1         | 973.3   | 777.7         | 932    |
| Nov. 23-29:                |               |        |               |         |               |        |
| Number of cars.....        | 7             | 1      | 28            | 3       | 35            | 4      |
| Number of boxes.....       | 6,000         | 1,008  | 22,978        | 3,100   | 28,978        | 4,108  |
| Average load.....          | 857.1         | 1,008  | 820.6         | 1,033.3 | 827.9         | 1,027  |
| Nov. 30-Dec. 6:            |               |        |               |         |               |        |
| Number of cars.....        | 5             |        | 20            |         | 25            |        |
| Number of boxes.....       | 4,426         |        | 16,332        |         | 20,758        |        |
| Average load.....          | 885.2         |        | 816.6         |         | 830.3         |        |
| Dec. 7-15:                 |               |        |               |         |               |        |
| Number of cars.....        | 4             |        | 25            |         | 29            |        |
| Number of boxes.....       | 3,024         |        | 19,758        |         | 22,782        |        |
| Average load.....          | 756           |        | 790.3         |         | 785.6         |        |
| Total for season:          |               |        |               |         |               |        |
| Total number of cars.....  | 118           | 15     | 257           | 68      | 375           | 83     |
| Total number of boxes..... | 92,584        | 13,587 | 194,100       | 65,327  | 286,684       | 78,914 |
| Average load.....          | 784.6         | 905.8  | 755.2         | 960.6   | 764.5         | 950.7  |

Grand total:

|   |         |
|---|---------|
| Total number of cars, August 15 to December 15.....     | 458     |
| Total number of boxes, August 15 to December 15.....    | 365,598 |
| Average load in all cars, August 15 to December 15..... | 798.2   |



## LOADING

The loading of refrigerator cars with apples nearer the ceiling than 18 inches is not recommended as a standard practice.

Early long-distance shipments should move under refrigeration and ordinarily should not be loaded more than five boxes high. These shipments should include the September and early October movement of such varieties as Grimes, Jonathan, Winter Banana, McIntosh, Delicious, and Spitzenberg.

By using 3 to 4 per cent salt with the ice at the time of loading, such carloads may be increased, under emergency demands, to six layers, but in no case should salt be used unless properly constructed floor racks are provided and the fruit next to the ice bunker is protected from freezing by an insulated bulkhead or temporary insulating material so placed as to provide ample openings at the floor and ceiling to permit free air circulation to and from the ice bunker.

When emergency necessitates increased loading, ventilated shipments, rather than those moving under refrigeration or heat, should be loaded heavily.

## STRIPPING AND BRACING

The following rules should be put into effect at every loading platform:

(1) Inspect bunker bulkheads and insure rigidity before loading, by bracing those likely to work loose.

(2) Clean out the cars beneath the floor racks before loading.

(3) Use floor racks having not less than 4-inch supports running lengthwise of the car. Do not load boxes on temporary strips, as they are of no importance in applying heat and often tilt or allow the boxes to slip off, resulting in a jumbled load and breakage.

(4) Place boxes an even distance apart, keep them in even stacks across the car, and have each box shoved firmly back to prevent slack.

(5) Use two car strips per box on the second, fourth, and top layers of boxes in each stack. Have each strip extend to the walls of the car. Use No. 6 cement-coated nails in the top strips, *two nails per box in each strip*. On lower strips use at least one nail per box in each strip.

(6) When loading the doorway full, squeeze the load well with a car squeeze before placing the final stack of fruit, and take up all slack with dunnage. Allow sufficient space above the load in the doorway for the entrance of inspectors.

(7) Brace tightly with good lumber, using construction with strength equivalent to that shown in figure 8.

Controlled ventilation maintains lower and more even fruit temperatures than standard ventilation. (See fig. 3.) It is recommended that ventilation practices be established that will effect the prompt opening and closing of ventilators by competent employees, in order

that full advantage may be taken of favorable outside temperatures for maintaining desirable and uniform fruit temperatures. Until adequate service in this respect is established by the carriers it is believed desirable that the shippers extend the messenger service that they have provided for protection against freezing for the purpose of regulating ventilation of cars in transit.

## CAR BRACING

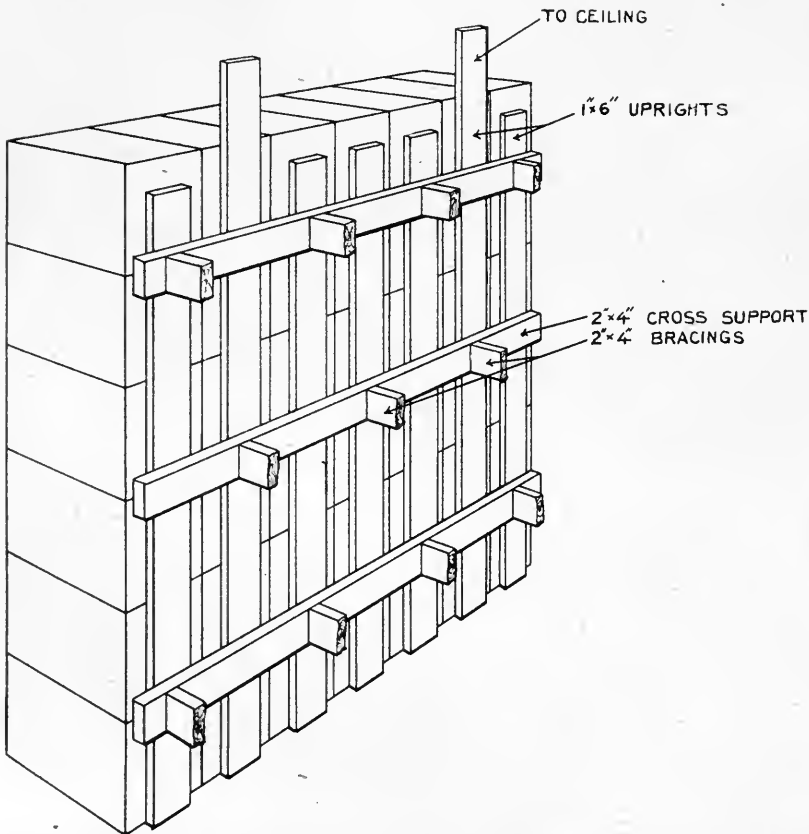


FIG. 8.—Diagram showing required strength and proper construction of car bracing for carloads of boxed apples. The load should be kept tight when placing boxes and should be well squeezed with bracings made of sound lumber.



## THE USE OF BOX CARS IN EMERGENCIES

Box cars are not suitable for long-distance fruit shipments, and their use for transporting perishable food products should be restricted, in so far as practicable, to short-haul shipments.

Tables 1 to 6 and the diagram in figure 7 show that during 1917 the supply of cars at hand in the Northwest was not used to the best advantage. Heavy loading was not practiced extensively until the car shortage was actually felt. Instead of loading cars heaviest when shipments were moving under ventilation, this was not done until several weeks after the normal season for ventilated shipments. Box cars were not utilized until the supply of refrigerator cars was practically exhausted, with their greatest use coming after favorable weather conditions were past. They were then used indiscriminately for all shipments, whether consigned to markets in adjoining States, or to those on the Atlantic seaboard.

It is recommended that shippers and carriers, through their representatives, meet periodically to compare the tonnage to be moved with the apparent car supply. When conditions apprehend the necessity for heavy loading or for the use of unsuitable equipment, such as box cars, as was the case in 1917, it would then be possible to effect heavy loading when shipping under ventilation rather than wait for the shortage to be actually visible, and box cars would be utilized over the entire season, but only for such fruit as ordinarily reaches a nearby market. The best regulation of loading and shipping cannot be made effective if the carriers and shippers work independently.

